

Def 19 p A.32

$$(a) \begin{cases} 2x + 3y = -10 \\ x - 5y = 21 \end{cases}$$

Regel Cramer:

$$x = \frac{\det B_1}{\det A}; y = \frac{\det B_2}{\det A}$$

$$\det A = \begin{vmatrix} 2 & 3 \\ 1 & -5 \end{vmatrix} = -13$$

$$x = \frac{\begin{vmatrix} -10 & 3 \\ 21 & -5 \end{vmatrix}}{-13} = \frac{50 - 63}{-13} = 1$$

$$y = \frac{\begin{vmatrix} 2 & -10 \\ 1 & 21 \end{vmatrix}}{-13} = \frac{42 + 10}{-13} = \frac{-52}{13} = -4$$

$$(c) \begin{cases} 5x + 3y + z = 2 \\ 5x + 4y - z = 5 \\ 10x + 9y - 5z = 14 \end{cases}$$

$$\det A = \begin{vmatrix} 5 & 3 & 1 \\ 5 & 4 & -1 \\ 10 & 9 & -5 \end{vmatrix} \stackrel{R_2 - R_1}{=} \begin{vmatrix} 5 & 3 & 1 \\ 0 & 1 & -2 \\ 0 & 3 & -7 \end{vmatrix}$$

$$k_1 = 5 \begin{vmatrix} 1 & -2 \\ 3 & -7 \end{vmatrix} \stackrel{R_3 - 2R_2}{=} 5(-1) = -5$$

$$x = \frac{\det B_1}{\det A} = \frac{-1}{5} \begin{vmatrix} 2 & 3 & 1 \\ 5 & 4 & -1 \\ 14 & 9 & -5 \end{vmatrix} \stackrel{k_1 + k_3}{=} \frac{-1}{5} \begin{vmatrix} 2 & 3 & 1 \\ 5 & 4 & -1 \\ 9 & 9 & 5 \end{vmatrix}$$

= 0

$$y = \frac{\det B_2}{\det A} = \frac{-1}{5} \begin{vmatrix} 5 & 2 & 1 \\ 5 & 5 & -1 \\ 10 & 14 & -5 \end{vmatrix}$$

$$y = -\frac{1}{5} \begin{vmatrix} 5 & 2 & 1 \\ 0 & 3 & -2 \\ 0 & 10 & -7 \end{vmatrix}$$
$$= -\frac{1}{5} \cdot 5 \cdot (-21 + 20) = 1$$

$$z = \frac{\det B_3}{\det A} = -\frac{1}{5} \begin{vmatrix} 5 & 3 & 2 \\ 5 & 4 & 5 \\ 10 & 9 & 14 \end{vmatrix}$$
$$= -\frac{1}{5} \begin{vmatrix} 5 & 3 & 2 \\ 0 & 1 & 3 \\ 0 & 3 & 10 \end{vmatrix}$$
$$= -\frac{1}{5} \cdot 5 \cdot (10 - 9) = -1$$

$$\begin{cases} x = 0 \\ y = 1 \\ z = -1 \end{cases}$$